(V) Preliminary Specifications
( ) Final Specifications

Model Name: V470FWSS02

Approved by	Signature Date	Approved by	Signature Date
_____	_____	_____	_____
		Review by	
_____	_____	_____	_____
		Prepared by	
_____	_____	Racoon Lee _____	2013/09/16 _____
		Wistron Corporation	

Record of Revision

Version	Date	Page	Description
0.1	2/20/2013		First Released
0.2	6/4/2013	8	Update String to String Δ Vf spec
0.3	8/5/2013	8	Update String to String Δ Vf spec&Current
0.4	09/16/2013	27	Update Product barcode Label

INDEX

1 GENERAL DESCRIPTION

1.1 OVERVIEW

The **V470FWSS02** is 47" TFT LCD module with WLED backlight and **51-pins LVDS interface**. The product supports 1920 x 1080 mode and can display up to **16.7 Milion colors(8 bit)**. The open cell is using LGD LC470EUJ.

1.2 FEATURES

- RoHS compliance (Pb-free)
- High color depth & wide color gamut
- Super wide viewing angle
- FHD resolution (16:9)
- Low power consumption
- Fast response time
- 4ch LVDS (Low Voltage Differential Signaling) interface (2pixel/clock)

1.3 APPLICATION

- TFT LCD TV

1.4 GENERAL SPECIFICATION

Item	Specification	Unit	Notice
Diagonal Size	47"	inch	-
Active Area	1039.68 (H) x 584.82 (V)	mm	(1)
Bezel Opening Area	1047.6(H) x 592.8 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1920 x R.G.B. x 1080	pixel	-
Pixel Pitch	541.5(H)x 541.5(V)	um	-
Pixel Arrangement	RGB stripe arrangement	-	-
Display Colors	**8 bit**, 16.7 Million	Color	-
Display Mode	Normally Black	-	-
Surface Treatment	Hard coating(2H), Anti-glare treatment of the front polarizer(Haze<1%)	-	-
Power Consumption	62.31	Watt	
Luminance of White	350	nits	

1.5 MECHANICAL SPECIFICATION

Item		Min	Typ.	Max	Unit	Notice
Module Size	Length	-	1060.4	-	mm	(1)
	Width	-	611.2	-	mm	
	Depth	-	15.6	-	mm	
Weight		-	11.05		kg	-

2 ABSOLUTE MAXIMUM RATING

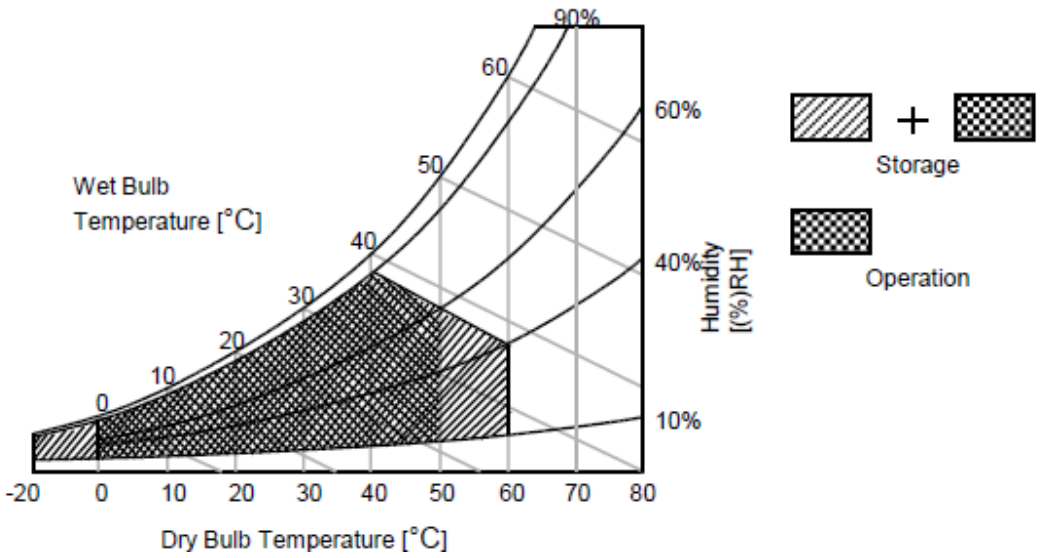
2.1 ENVIRONMENT ABSOLUTE RATINGS

if the condition exceeds maximum ratings, it can cause malfunction or unrecoverable damage to the device.

Item	Symbol	Value		Unit	Notice
		Min	Max		
Power Supply Voltage	V_{LCD}	-0.3	14	V	(1)
Storage temperature	T_{STG}	-20	60	℃	(2)(3)
Operating temperature	T_{OPR}	0	50	℃	(2)(3)
Surface temperature	T_{SUR}	-	68	℃	(4)
Storage humidity	H_{STG}	10	90	%RH	(2)(3)
Operating humidity	H_{STG}	10	90	%RG	(2)(3)

Note

1. Ambient temperature condition (Ta = 25 ±2 °C)
2. Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be Max 39 °C and no condensation of water.
3. Gravity mura can be guaranteed below 40℃condition.
4. The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 68 ℃with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 68 ℃. The range of operating temperature may degrade in case of improper thermal management in final product design.



3 Electrical characteristics

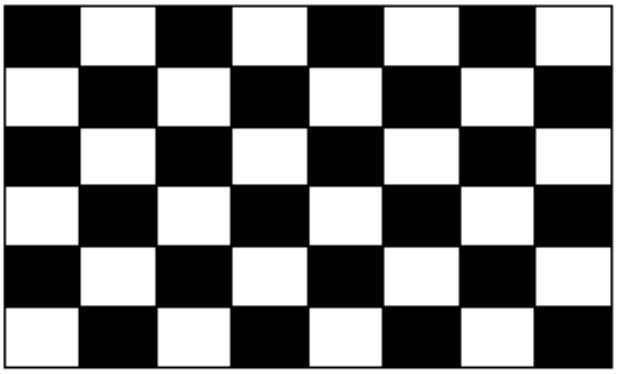
3.1 OPEN CELL

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Input Voltage	V_{LCD}	10.8	12.0	13.2	V	
Power Input Current	I_{LCD}		501	626	mA	1
			717	897	mA	2
Power Consumption	P_{LCD}		6.01	8.26	Watt	1
Rush current	I_{Rush}			5.0	A	3

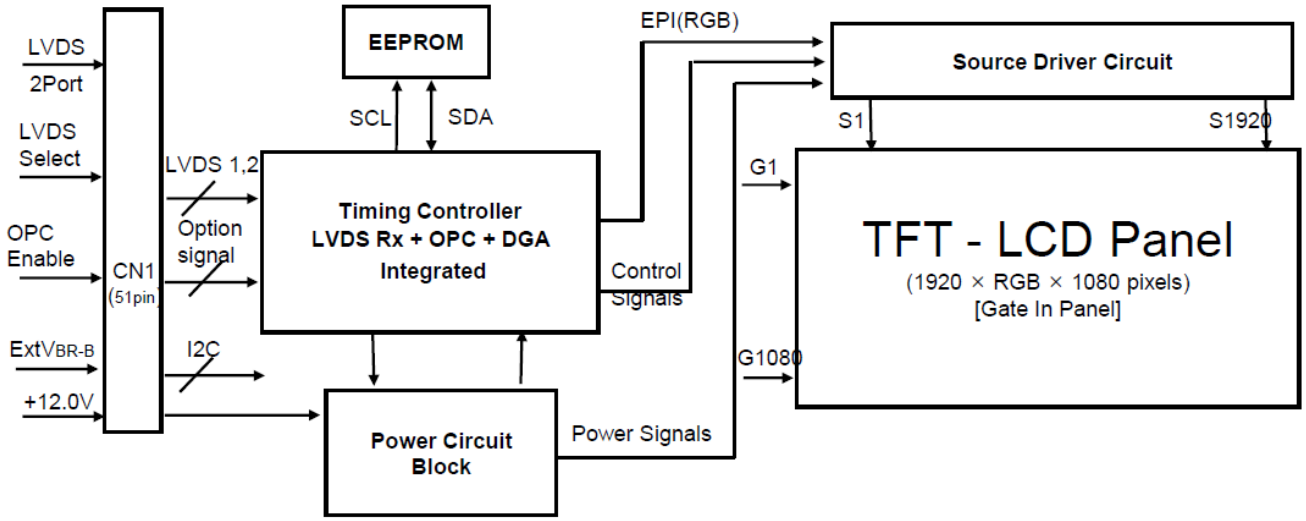
Note:

1. The specified current and power consumption are under the V_{LCD}=12.0V, Ta=25±2°C, f_V=60Hz condition, and mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
2. The current is specified at the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).
4. Ripple voltage level is recommended under ±5% of typical voltage

White : 255 Gray
Black : 0 Gray

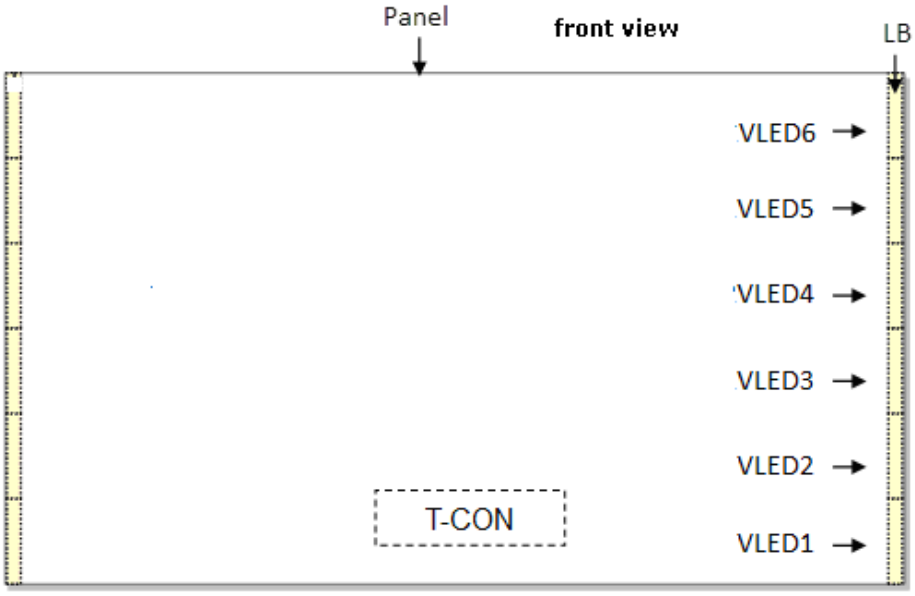


Mosaic Pattern(8 x 6)



3.2 BACKLIGHT UNIT

The back light unit contains Edge type white LEDs (Ta=25±2℃) (Front view)



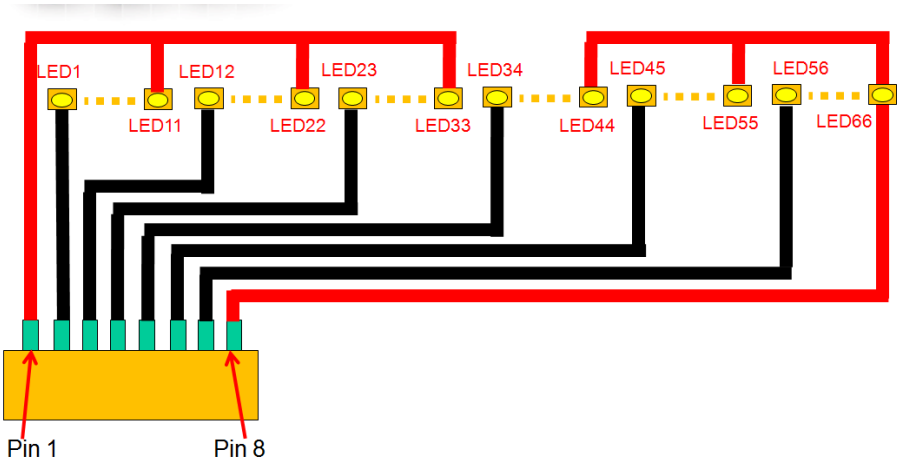
LB Spec:

CN of LB to DB cable type : A2008H00-8P

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	V_{PIN}		72.6	78.7	V	(1) Duty=100%, I_{PIN}=130mA
LED Light Bar Current Per Input Pin	I_{PIN}	-	130	136	mA	(1), (2) Duty=100%
String to String Δ Vf	Δ Vf			2.2	V	I_{PIN}=130mA
LED Life Time	L_{LED}	30000	-	-	Hrs	(3)
Power Consumption (No Scanning)	P_{BL}		56.3		W	(1) Duty=100%, I_{PIN}=130mA

Note

(1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below
(2) $P_{BL} = I_{PIN} \times V_{PIN} \times 6$ (String) , LED light bar circuit is (11)Series, (6) String.
(3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (130)mA (per chip) until the brightness becomes ≦ 50% of its original value
(4) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.
(5) Specified values are for input pin of LED light bar at Ta=25±2 ℃



3.3 INPUT TERMINAL PIN ASSIGNMENT

- LCD Connector (CN1): FI-RES51S-HF (manufactured by JAE)
- Mating Connector: FI-R51HL (JAE) or compatible

3.3.1 LVDS PIN ASSIGNMEN(51-pin) Connector: FI-RE51S-HF(JAE) or compatible

PIN	Name	Description	PIN	Name	Description
1	NC or GND	No Connection or Ground	26	NC or GND	No Connection or Ground
2	NC	No Connection (Note 4)	27	NC	No Connection
3	NC	No Connection (Note 4)	28	R2AN	2nd LVDS signal A-
4	NC	No Connection	29	R2AP	2nd LVDS signal A+
5	NC	No Connection	30	R2BN	2nd LVDS signal B-
6	NC	No Connection	31	R2BP	2nd LVDS signal B+
7	LVDS Select	H=JEIDA, L or NC=VESA	32	R2CN	2nd LVDS signal C-
8	NC	No Connection (Note 4)	33	R2CP	2nd LVDS signal C+
9	NC	No Connection (Note 4)	34	GND	Ground
10	NC	No Connection (Note 4)	35	R2CLKN	2nd LVDS clock signal(-)
11	GND	Ground	36	R2CLKP	2nd LVDS clock signal(+)
12	R1AN	1st LVDS signal A-	37	GND	Ground
13	R1AP	1st LVDS signal A+	38	R2DN	2nd LVDS signal D-
14	R1BN	1st LVDS signal B-	39	R2DP	2nd LVDS signal D+
15	R1BP	1st LVDS signal B+	40	NC	No Connection
16	R1CN	1st LVDS signal C-	41	NC	No Connection
17	R1CP	1st LVDS signal C+	42	NC or GND	No Connection or Ground
18	GND	Ground	43	NC or GND	No Connection or Ground
19	R1CLKN	1st LVDS clock signal(-)	44	GND	Ground
20	R1CLKP	1st LVDS clock signal(+)	45	GND	Ground
21	GND	Ground	46	GND	Ground
22	R1DN	1st LVDS signal D-	47	NC	No Connection
23	R1DP	1st LVDS signal D+	48	VLCD	Power Supply +12V
24	NC	No Connection	49	VLCD	Power Supply +12V
25	NC	No Connection	50	VLCD	Power Supply +12V
			51	VLCD	Power Supply +12V

Note
1. All GND (ground) pins should be connected together to the LCD module's metal frame.
2. All V_{LCD}(power input) pins should be connected together.
3. All input levels of LVDS signals are based on the **EIA 644** Standard.
4. #1~#6 & #8~#10 NC (No Connection): These pins are used only for LGD (do not connect)
5. Specific pin No. #44 is used for "No signal detection " of system signal interface. It should be GND for NSB (No Signal Black) during the system interface signal is not. If this pin is "H" ,LCD Module displays AGP (Auto Generation Pattern).

3.3.2 Backlight LB connector Pin Assignment

Connector Part NO. : A2008H00-8P or Equivalent

Pin number	Description
Pin 1	VIN
Pin 2	LVLED1
Pin 3	LVLED2
Pin 4	LVLED3
Pin 5	LVLED4
Pin 6	LVLED5
Pin 7	LVLED6
Pin 8	VIN

3.4 Signal Timing Specifications

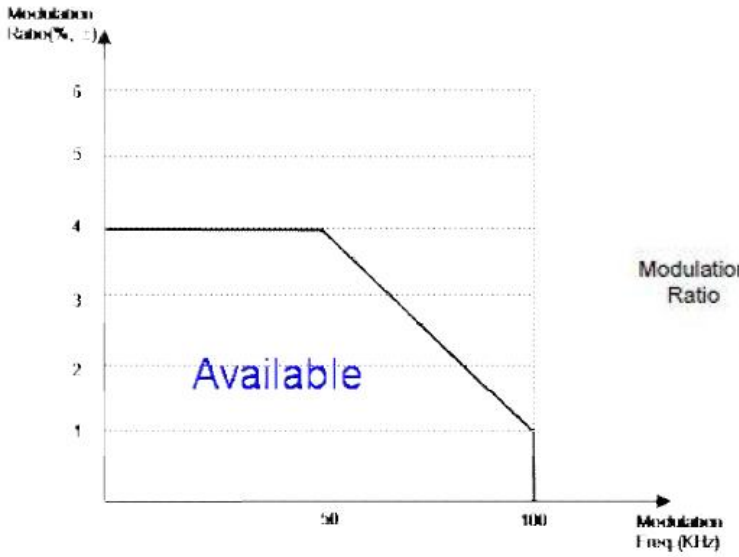
Below table shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

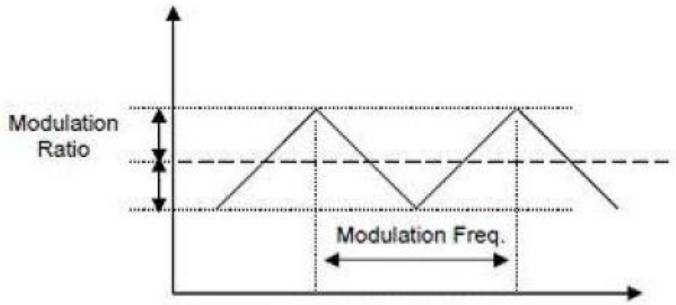
Item		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	fCLK	63.00	74.25	78.00	MHz	-
	Hsync	FH	57.3	67.5	70	KHz	-
	Vsync	FV	57 (47)	60 (50)	63 (53)	Hz	2 NTSC (PAL)
Vertical	Display Period	TVV	1080	1080	1080-	Lines	-
	Blank	tVB	20 (228)	45 (270)	69 (300)	Lines	1
	Vertical Total	TVP	1100 (1308)	1125 (1350)	1149 (1380)	Lines	-
Horizontal	Display Period	THV	960	960	960-	tCLK	1920/2-
	Blank	tHB	100	140	240	tCLK	1
	Horizontal Total	THP	1060	1100	1200	tCLK	-

Note:

1. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode). If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.
2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency
3. Spread Spectrum Rate (SSR) for 50KHz~ 100kHz Modulation Frequency (FMOD) is calculated by (7- 0.06*Fmod), where Modulation Frequency (FMOD) unit is KHz.
   LVDS Receiver Spread spectrum Clock is defined as below figure.

※Timing should be based on clock frequency.



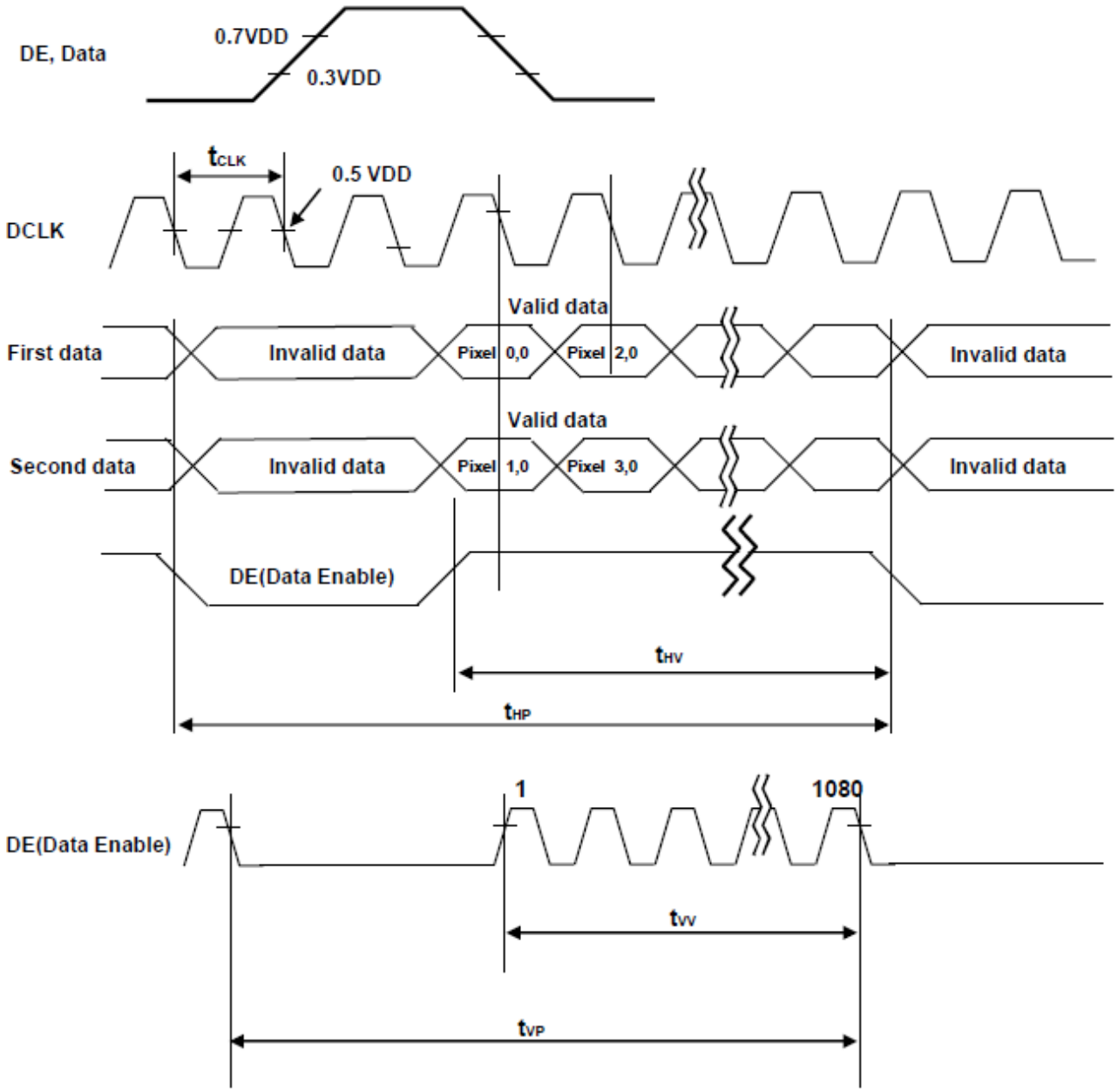


※ Please pay attention to the followings when you set Spread Spectrum Rate (SSR) and Modulation Frequency (FMOD)

1. Please set proper Spread Spectrum Rate (SSR) and Modulation Frequency (FMOD) of TV system LVDS output.
2. Please check FOS after you set Spread Spectrum Rate (SSR) and Modulation Frequency (FMOD) to avoid abnormal display. Especially, harmonic noise can appear when you use Spread Spectrum under FMOD 30KHz.

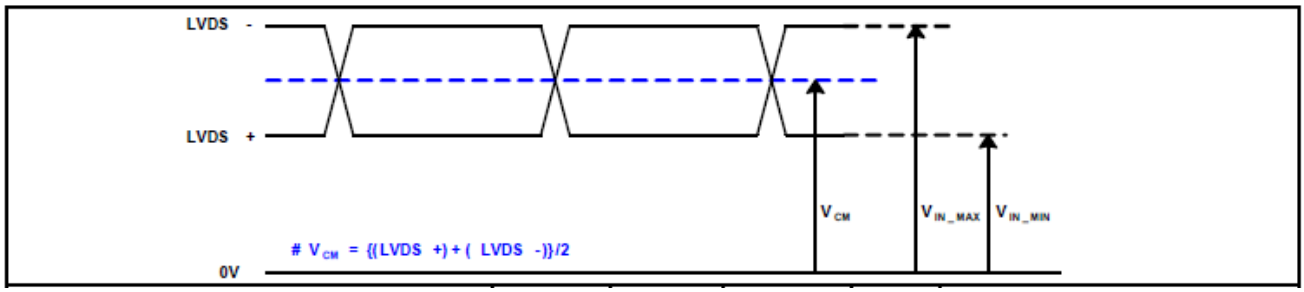
3.5 LVDS Signal Specification

3-5-1. LVDS Input Signal Timing Diagram



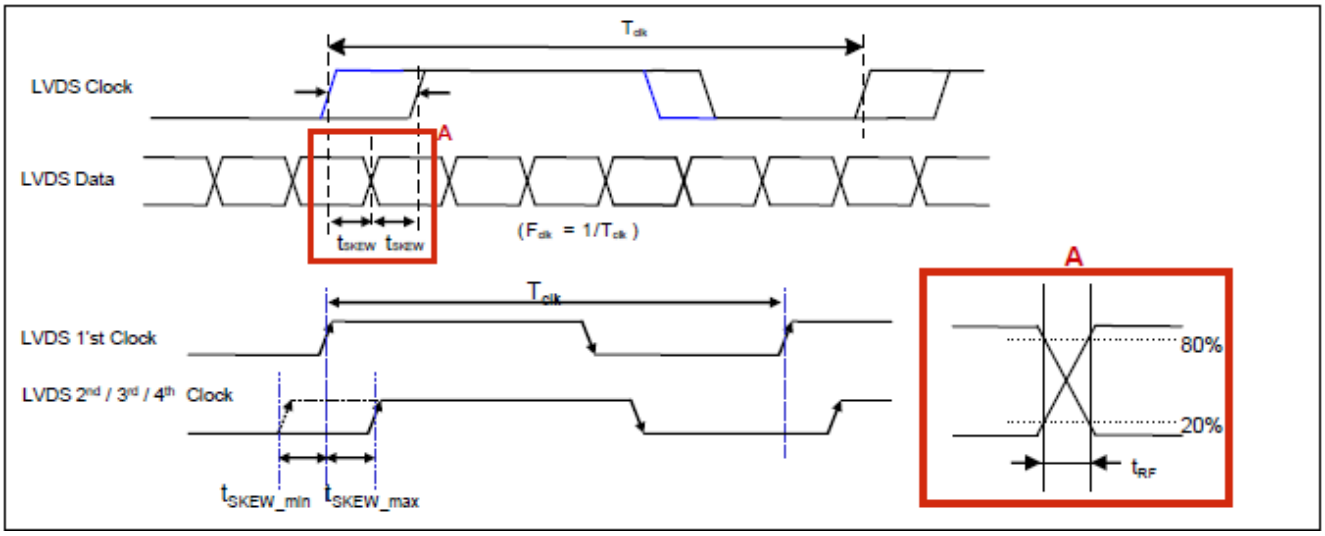
3-5-2. LVDS Input Signal Characteristics

3-5-2-1 DC Specification



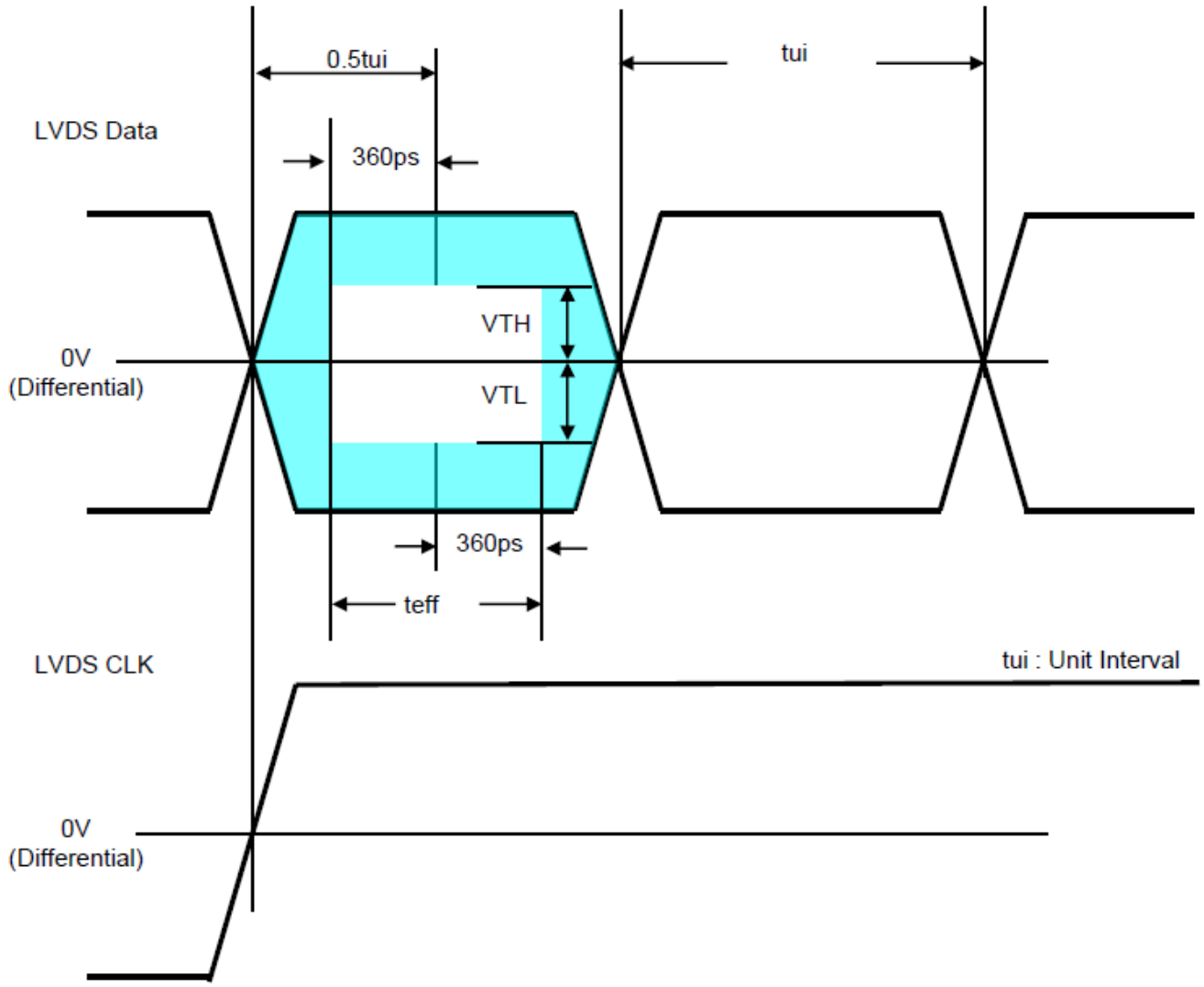
Description	Symbol	Min	Max	Unit	Note
LVDS Common mode Voltage	V_{CM}	1.0	1.5	V	
LVDS Input Voltage Range	V_{IN}	0.7	1.8	V	
Change in common mode Voltage	ΔV_{CM}	-	250	mV	

3-5-2-2 AC Specification



Description		Symbol	Min	Max	Unit	Note
LVDS Differential Voltage	High Threshold	V_{TH}	100	300	mV	3
	Low Threshold	V_{TL}	-300	-100	mV	
LVDS Clock to Data Skew		t_{SKEW}	-	$\|(0.20*T_{clk})/7\|$	ps	-
LVDS Clock/Data Rising/Falling time		t_{RF}	260-	$\|(0.3*T_{clk})/7\|$	ps	2
Effective time of LVDS		t_{eff}	$\|\pm360\|$	-	ps	-
LVDS Clock to Clock Skew (Even to Odd)		t_{SKEW_EO}	-	$\|1/7*T_{clk}\|$	ps	-

Note 1. All Input levels of LVDS signals are based on the EIA 644 Standard.
2. If t_{RF} isn't enough, t_{eff} should be meet the range.
3. LVDS Differential Voltage is defined within t_{eff}



* This accumulated waveform is tested with differential probe

3-6. Color Data Reference

The brightness of each primary color (red, green, blue) is based on the 10bit gray scale data input for the color. The higher binary input, the brighter the color. Below table provides a reference for color versus data input.

COLOR DATA REFERENCE

Color		Input Color Data																									
		RED								GREEN								BLUE									
		MSB							LSB	MSB							LSB	MSB							LSB		
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0		
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
RED	RED (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED (001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	...	...								...								...									
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GREEN	GREEN (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	...	...								...								...									
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
BLUE	BLUE (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	...	...								...								...									
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0		
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		

3-7. Power Sequence

3-7-1. LCD Driving circuit

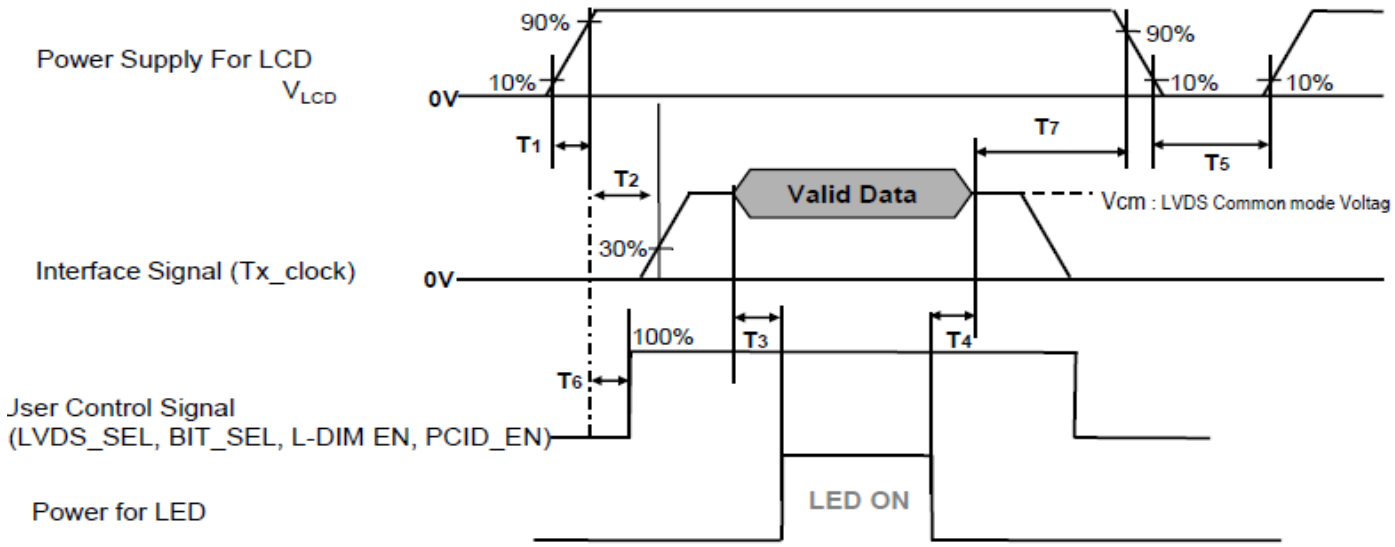


Table 1.

Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	1
T2	0	-		ms	2
T3	400	-		ms	3
T4	200	-		ms	3
T5	1.0	-		s	4
T6	0	-	T2	ms	5
T7	0	-		ms	6

Note:

1. Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
2. If T2 is satisfied with specification after removing LVDS Cable, there is no problem.
3. The T3/T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
4. T5 should be measured after the Module has been fully discharged between power off and on period.
5. If the on time of signals (Interface signal and user control signals) precedes the on time of Power (V_{LCD}), it will be happened abnormal display. When T6 is NC status,T6 doesn't need to be measured.
6. It is recommendation specification that T7 has to be 0ms as a minimum value.

※Please avoid floating state of interface signal at invalid period.

※When the power supply for LCD (VLCD) is off, be sure to pull down the valid and invalid data to 0V.

4 OPTICAL CHARACTERISTICS

4.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	Vpin	72.6	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current (Per Input Pin)	IPIN	130	mA_{DC}
PWM Duty Ratio	D	100	%
LED Light Bar Test Converter	By OBD define		

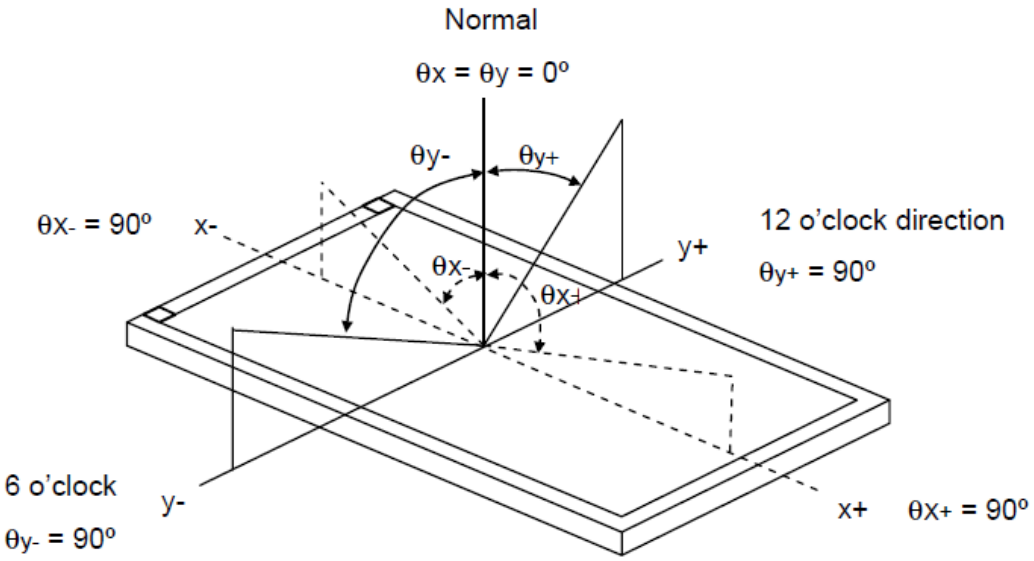
4.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 4.1 and stable environment shown in Note (5).

Item			Symbol	Condition	Value			Unit	Note
					Min	Typ	Max		
Color Chromaticity (CIE 1931)	Red		Rx	θ_x =0° θ_Y =0° CS-2000A	Typ -0.03	0.65	Typ+0.03	-	(1) (5)
			Ry			0.335			
	Green		Gx			0.315			
			Gy			0.605			
	Blue		Bx			0.15			
			By			0.059			
	White		Wx		0.255	0.285	0.315		
			Wy		0.272	0.302	0.332		
Center Luminance of White (Center of Screen)			Lc			350	-	-	(4) (5)
Contrast Ratio			CR		1000	1400	-		(2) (5)
Color Gamut			NTSC			72	-	%	
Response Time	Variation		G to G_σ			6	9		
	G-to-G (BW)		G-to-G (BW)		- -	8	12	ms	(3)
White Variation (9P)			δw	θ_x=0° θ_Y=0° CS-2000A		75	-	%	(5) (6)
Viewing Angle	2D (CR>10)	*Horizontal*	θ_{x+}	CR≧10 CS-2000A	89	-	-	Deg.	(1),(5)
			θ_{x-}		89	-	-		
		Vertical	θ_{y+}		89	-	-		
			θ_{y-}		89	-	-		
	3D (CT≦ 10%)	Vertical	θ_{y+}+ θ_{y-}	CT≦10%	16	20		Deg.	(8)
3D Crosstalk			3D C/T			1	3	%	(8)
Gray Scale					-	-	-		(9)

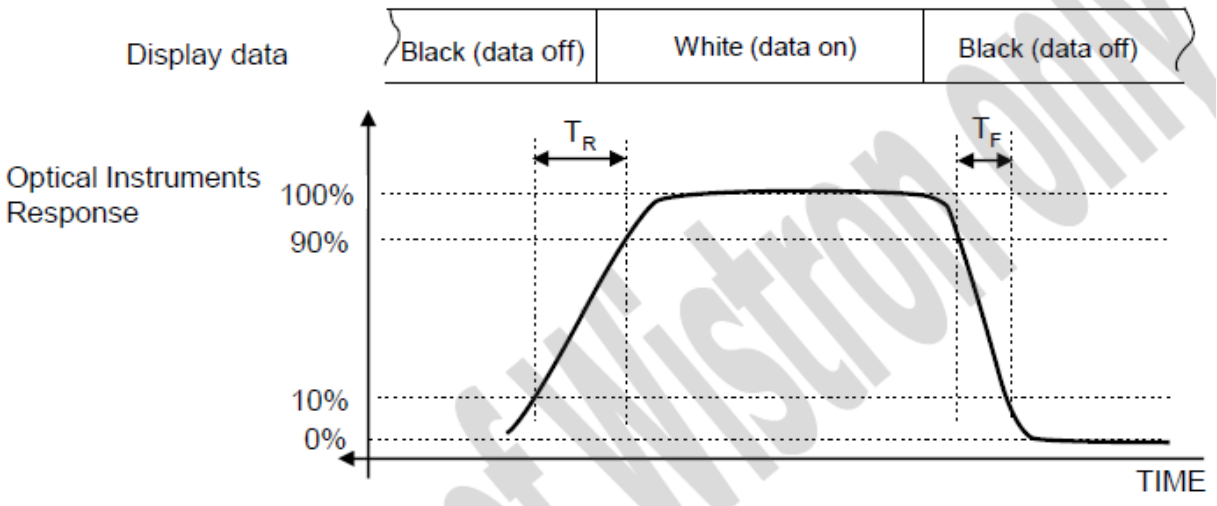
Note

(1) Definition of Viewing Angle (θx, θy):



(2) Definition of Contrast Ratio (CR):
The contrast ratio can be calculated by the following expression.
Contrast Ratio (CR) = L255 / L0
L255: Luminance of gray level 255
L 0: Luminance of gray level 0
CR = CR (1)
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

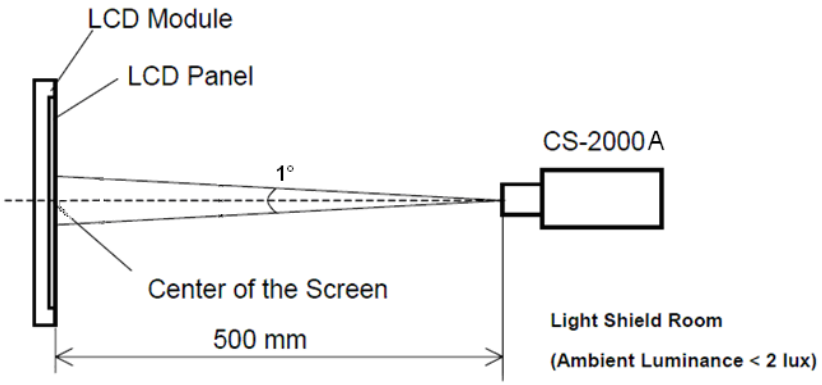
(3) Definition of Response Time : Sum of T_R, T_F



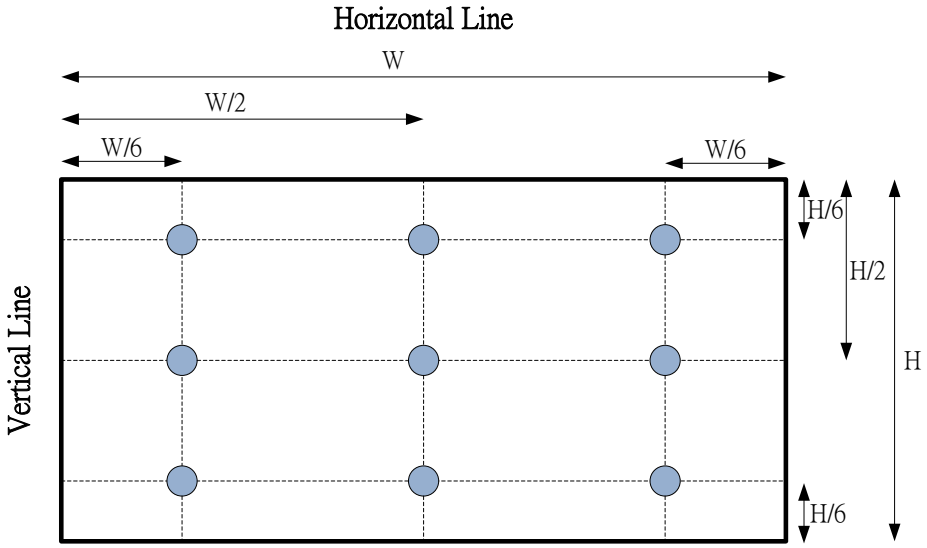
※ G-to-G : Average response time between Gray to Gray (Scale)

(4) Definition of Luminance of White (L_C):
Measure the luminance of gray level 255 at center point
L_C = L (1)
L (x) is corresponding to the luminance of the point X at Figure in Note (6).

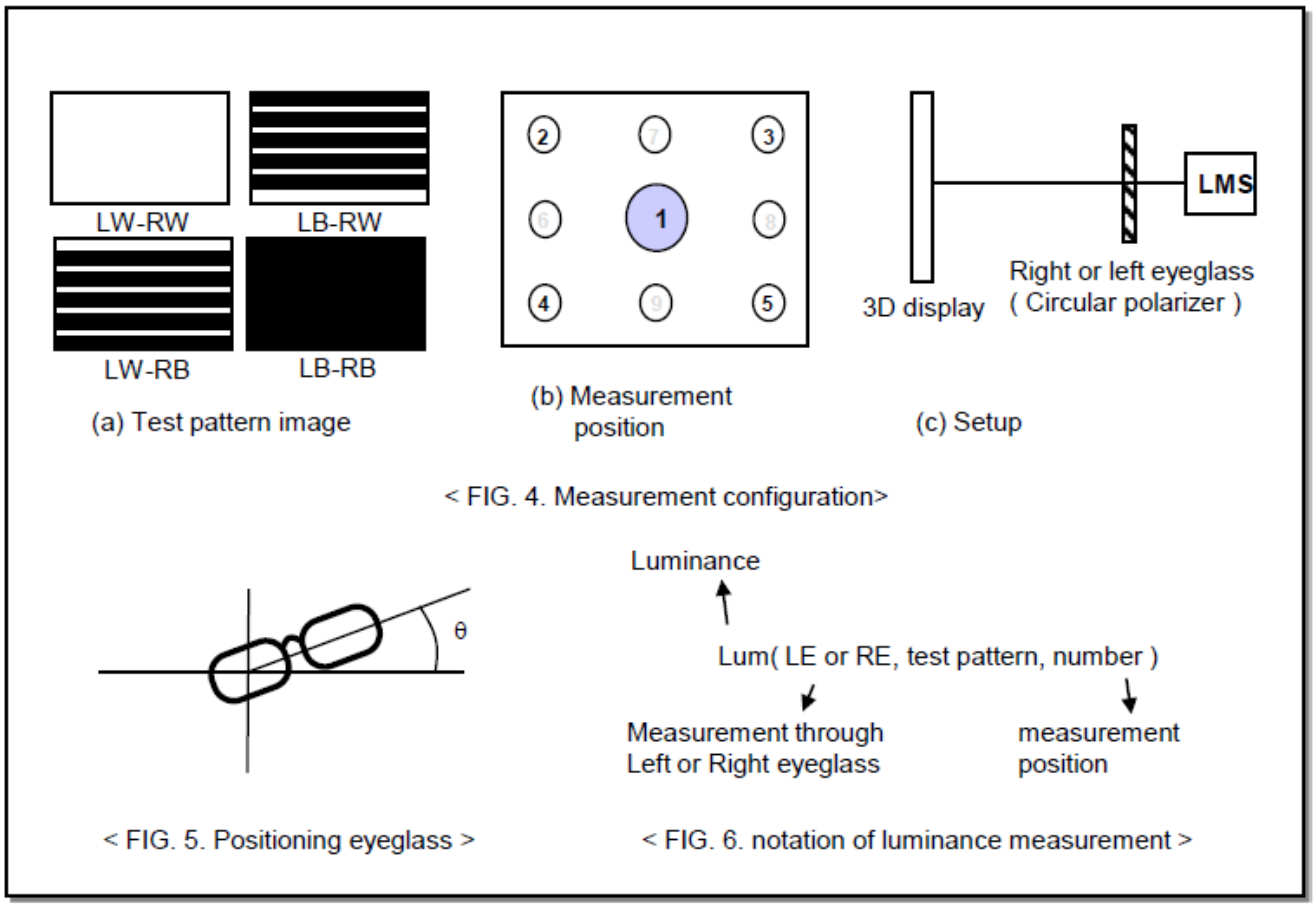
(5) Measurement Setup:
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 20 minutes in a windless room



(6)Definition of white variation (δW):
Measure the luminance of gray level 255 at 9 points
δW = Maximum [L (1), L (2) ……L (4), L (9)] / Minimum [L (1), L (2) …… L (4), L (9)]



(7)G to G_σ is Variation of Gray to Gray response time composing a picture
G to G(σ) = $\sqrt{}$(Σ (Xi-u)^2/N); Xi = Individual Data, u = Data average, N: The number of Data
(8) 3D performance specification is expressed by 3D luminance and 3D viewing angle.
(9) Gray scale specification
Gamma Value is approximately 2.2. For more information , see the Table 1.



In order to measure 3D luminance, 3D crosstalk and 3D viewing angle, it need to be prepared as below;

1) Measurement configuration
4-Test pattern images. Refer to FIG4.
-. LW-RW: White for left and right eye
-. LW-RB: White for left eye and Black for right eye
-. LB-RW: Black for left eye and white for right eye
-. LB-RB: Black for left eye and right eye
Image files where black and white lines are displayed on even or odd lines.
Luminance measurement system (LMS) with narrow FOV (files of view) is used.
2) Positioning Eyeglass (refer to appendix-VII for standard specification of eyeglass)
(i) Test image (LB-RW) is displayed.
(ii) Left eyeglass are placed in front of LMS and luminance is measured,
Rotating right eyeglass such as FIG5. The rotation for luminance measurement is “LUM(LE, LB-RW,1)”.
(ii) Find the angle where luminance is minimum.

*Following measurements should be performed at the angle of minimum transmittance of eyeglass.
3) Measurement of 3D luminance
(i) Test image (LW-RW) is displayed.
(ii) Left or right eyeglass are placed in front of LMS successively and
Luminance is measured at center 1 point where the notation for luminance measurement is “Lum(LE,LW-RW,1)” or “Lum(RE, LW-RW, 1).

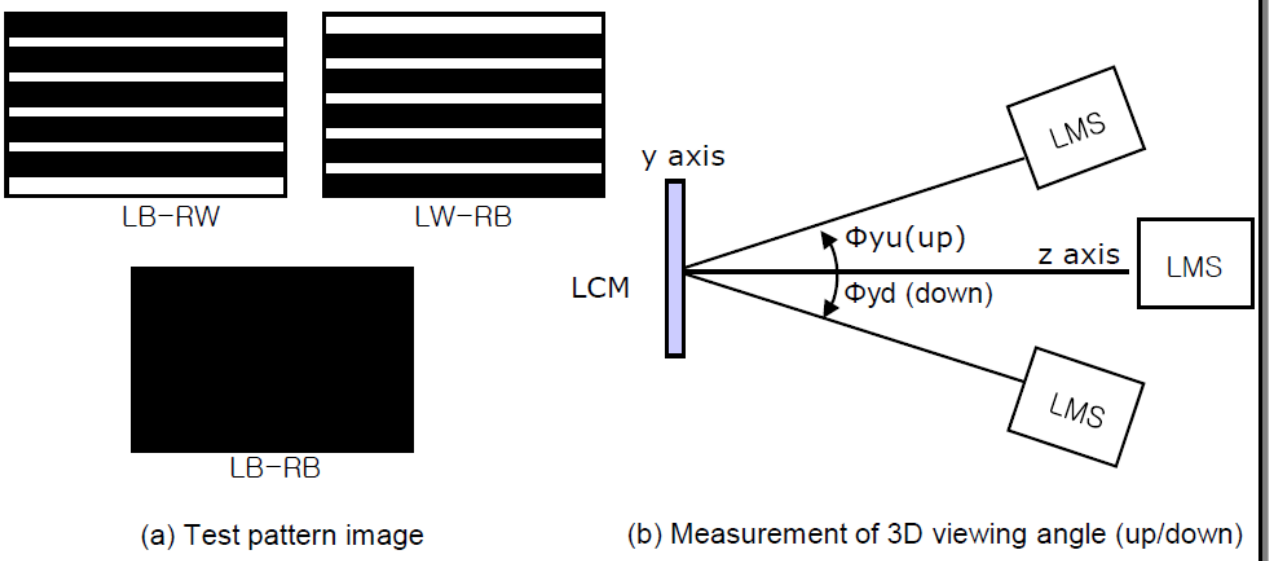
4) Measurement of 3D crosstalk
(i) Test image (LB-RW, LW-RB and LB-RB) is displayed.
(ii) Right or left eyeglass are placed in front of LMS successively and luminance is measured for position 1.
with rotation LMS or sample vertically.

$$\frac{Lum(LE, LB\text{-}RW,1) - Lum(LE, LB\text{-}RB,1)}{Lum(LE, LW\text{-}RB,1) - Lum(LE, LB\text{-}RB,1)}$$

or

$$\frac{Lum(RE, LW\text{-}RB,1) - Lum(RE, LB\text{-}RB,1)}{Lum(RE, LB\text{-}RW,1) - Lum(RE, LB\text{-}RB,1)}$$

5) Measurement of 3D Viewing Angle
3D viewing angle is the angle at which the 3D crosstalk is under 10%. The angles are Determined for the vertical or y axis with respect to the z axis which is normal to the LCD Module surface and measured for position 1. For more information, see the Fig7

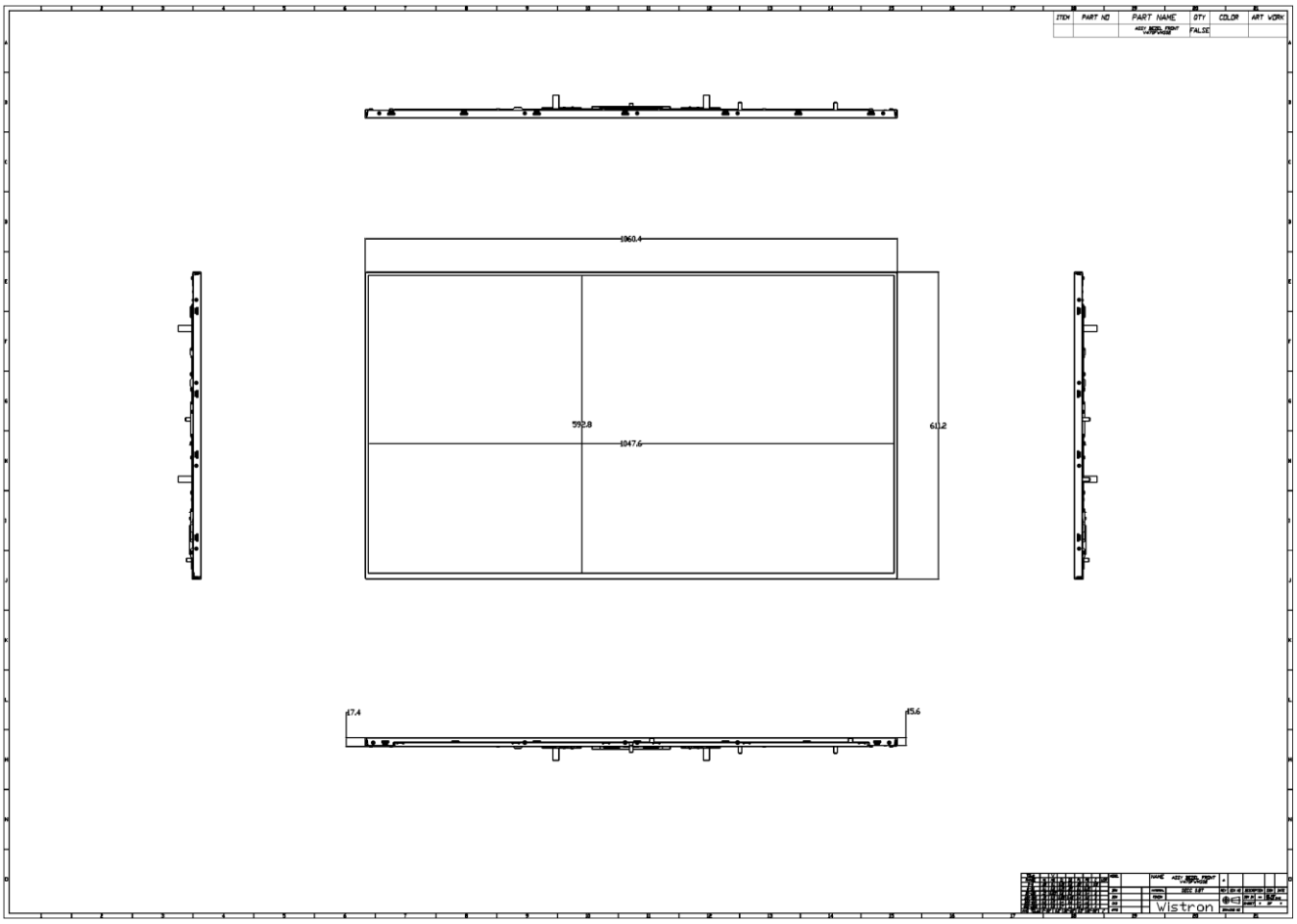


(a) Test pattern image (b) Measurement of 3D viewing angle (up/down)

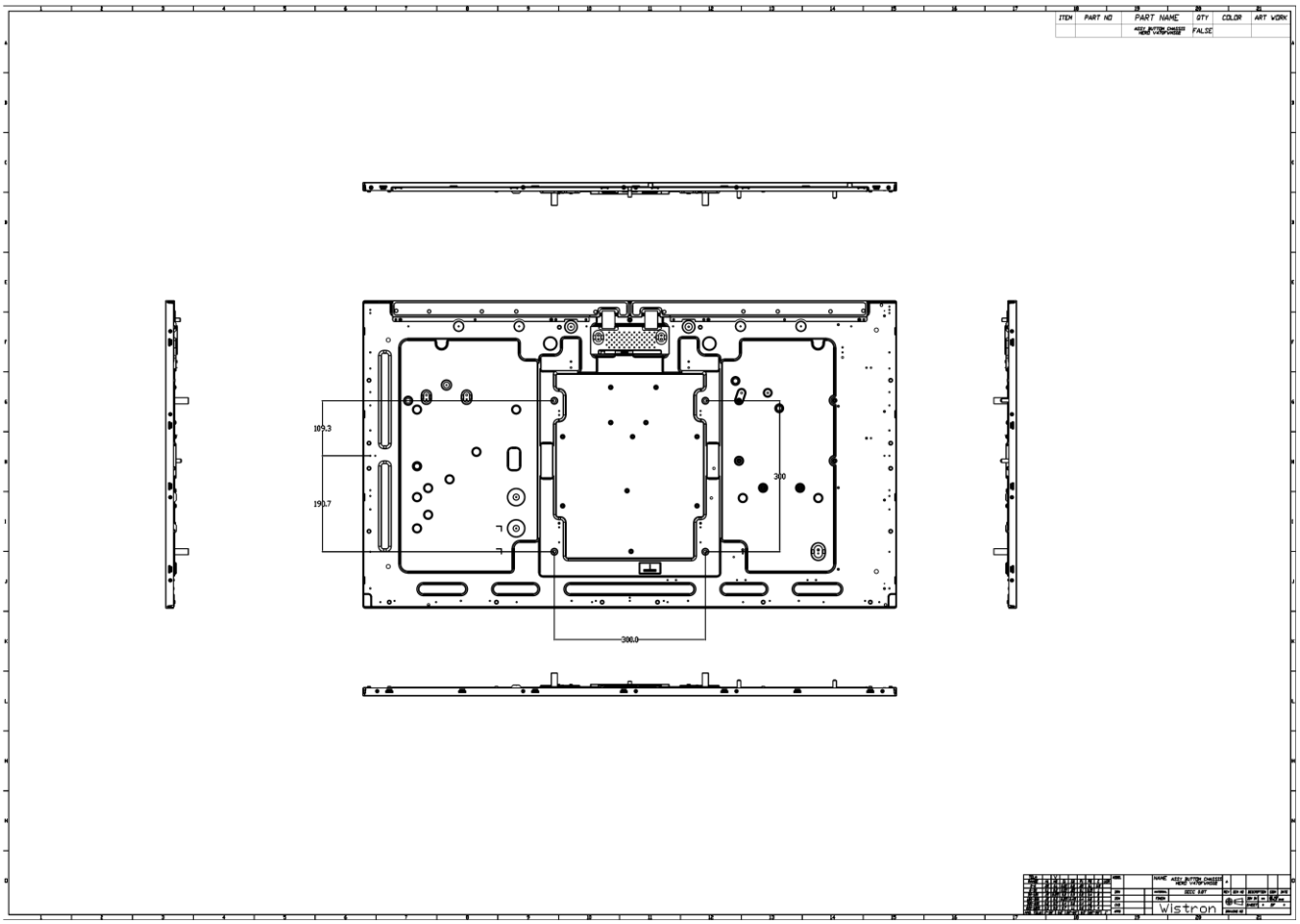
< FIG. 7. Measurement of 3D crosstalk and 3D viewing angle >

5 MECHANICAL CHARACTERISTICS

5.1 FRONT SIDE (W/O SYSTEM COVER)



5.2 BACK SIDE



6 RELIABILITY TEST

Environment test conditions are listed as following table.

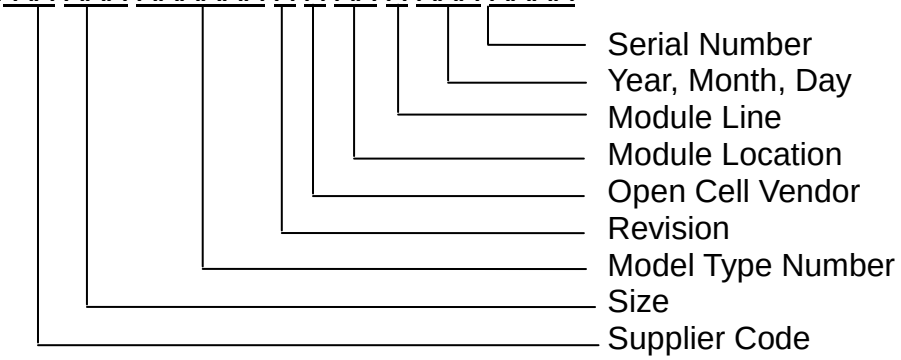
No.	Items	Required Condition
1	High Temperature Operation Life (HTOL)	Ta= 50℃ , 50%RH , 250hours
2	Low Temperature Operation Life (LTOL)	Ta= 0℃ , 250hours
3	Low Temperature Storage (LTS)	Ta= -20°C, 250 hours
4	Wet High Temperature Storage (WHTS)	40℃ , 90%RH, 250hours
5	Vibration Test (With TV packing)	5-50-5Hz (1cycle/3min), 19.8-0.2mm, 1G, Up/Down 20cycles (other side 5cycles)
6	Drop Test (With TV packing)	Surface-60cm, Corner/Edge-48cm, 1 Corner/ 3 Edge/ 6 Surface
7	ESD (Electro Static Discharge)	. LCD Operation/Contact: ±8 kV, 1cm, 1 time/Point for metal front bezel,330Ω/150pf . LCD Operation/Air: ±12 kV, 1cm, 1 time/Point for the gap between front bezel and open cell,330Ω/150pf
8	Pallet Vibration	Random wave/ 5~50Hz @ 0.021720 g2/Hz.Z axis,1H
9	Pallet Drop	28cm, Bottom flat two times

Note 1
This is front bezel integration design so that drop/vibration test could not be performed by individual panel module. Please refer to TV set test result for this 2 tests.

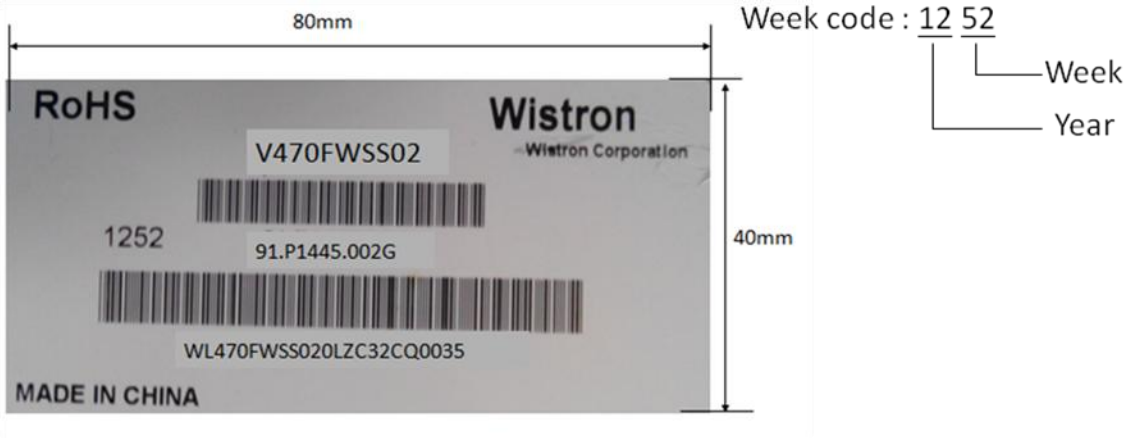
7 Labels

7.1 LABELS DEFINE

(1) LCM module Model Name : V470FWSS02
(2) LCM Part Number : NA
(3) Lot No. : XX XXX XXXXXX X X XX X XXX XXXX



SAMPLE:



8 PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.
(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
(5) Do not pull the I/F connector in or out while the module is operating.
(6) Do not disassemble the module.
(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(10) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

8.2 SAFETY PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.
(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
(3) After the module's end of life, it is not harmful in case of normal operation and storage.

8.3 STORAGE

(1) Do not store the TFT – LCD module in direct sunlight
(2) The module should be stored in dark place. It is prohibited to apply sunlight or fluorescent light in storing
(3) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0℃ to 35℃ And relative humidity of less than 70%

8.4 OPERATION CONDITION GUIDE

(1) The LCD product should be operated under normal condition.
Normal condition is defined as below
Temperature : 20±15℃
Humidity: 65±20%
Display pattern : continually changing pattern(Not stationary)
(2) If the product will be used in extreme conditions such as high temperature, high humidity , high altitude ,display pattern or operation time etc…It is strongly recommended to contact Wistron for application engineering advice . Otherwise , Its reliability and function may not be guaranteed

8.5 OTHER

When fixed patterns are displayed for a long time, remnant image is likely to occur.